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14. ABSTRACT Today more than ever, the U.S. military relies on rapid global mobility to enable joint force deployment, sustainment, and maneuverability, ensuring combat power can be delivered anywhere, anytime. The United States Transportation Command (USTRANSCOM) Commander, as the provider of joint mobility forces, has flexible airlift capability in the Civil Reserve Air Fleet (CRAF) to provide rapid global reach in support of the warfighter. Without guaranteed access to CRAF for both steady-state operations and surge war scenarios, airlift capacity will not meet DOD requirements. This paper explores innovative opportunities for the CRAF to gain capability and improve efficiency. Finally, this paper draws the conclusion that USTRANSCOM must transform CRAF capabilities to meet the evolving joint deployment mission in a fiscally constrained environment.								
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**Transforming the Civil Reserve Air Fleet (CRAF) to Enable Combat Power in a
Fiscally Constrained Environment**

by

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**A paper submitted to the Faculty of the Naval War College in partial satisfaction of the
requirements of the Department of Joint Military Operations.**

**The contents of this paper reflect my own personal views and are not necessarily
endorsed by the Naval War College or the Department of the Navy.**

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Transforming the Civil Reserve Air Fleet (CRAF) to Enable Combat Power in a Fiscally Constrained Environment

Abstract

Today more than ever, the U.S. military relies on rapid global mobility to enable joint force deployment, sustainment, and maneuverability, ensuring combat power can be delivered anywhere, anytime. The United States Transportation Command (USTRANSCOM) Commander, as the provider of joint mobility forces, has flexible airlift capability in the Civil Reserve Air Fleet (CRAF) to provide rapid global reach in support of the warfighter. Without guaranteed access to CRAF for both steady-state operations and surge war scenarios, airlift capacity will not meet DOD requirements. This paper explores innovative opportunities for the CRAF to gain capability and improve efficiency. Finally, this paper draws the conclusion that USTRANSCOM must transform CRAF capabilities to meet the evolving joint deployment mission in a fiscally constrained environment.

Introduction

“The United States remains the only nation able to project and sustain large-scale military operations over extended distances. We maintain superior capabilities to deter and defeat adaptive enemies and to ensure the credibility of security partnerships that are fundamental to regional and global security. In this way, our military continues to underpin our national security and global leadership, and when we use it appropriately, our security and leadership is reinforced.”

-- President Barak Obama, National Security Strategy May 2010

The expeditionary nature of U.S. warfare today relies on rapid global reach to defeat irregular threats in the furthest corners of the earth, to deter rogue dictators who seek to acquire nuclear or biological weapons, and to deliver humanitarian aid to the impoverished regions of the world. Enter the United States Transportation Command (USTRANSCOM), a supporting combatant command providing joint mobility forces to geographic combatant commanders and also serving as the Defense Distribution Process Owner. The mission of USTRANSCOM is to get the warfighters to the fight, sustain them during the fight, support rapid force maneuver and patient movement, and finally, bring the warfighter home.¹

Projecting and sustaining joint forces over great distances has always been a strength of the U.S. military. The emphasis and challenge today however, is the speed of force projection, which is critical to campaign success and achievement of U.S. national security objectives.² Speed in delivery, especially for the land locked environments in which the U.S. operates today, means integrated airlift, both inter-theater (strategic) airlift and intra-theater (tactical) airlift. Air Mobility Command (AMC) is USTRANSCOM's component command responsible for providing strategic and tactical airlift, air refueling, and aeromedical evacuation services for U.S. forces.³ AMC provides global reach through a mix of organic

¹ Mr. Craig Koontz, “USTRANSCOM,” Powerpoint, 13 September 2010, Newport, RI: Naval War College.

² Gen (Ret) William G.T. Tuttle, Jr., Defense Science Board Task Force Chairman, Memorandum to Defense Science Board, 20 February 2004, 1.

³ United States Transportation Command official Web site, “USTRANSCOM’s Transportation Component Commands,” <http://www.transcom.mil/organization.cfm> (accessed 26 August 2010).

aircraft, and through commercial airlines via the Civil Reserve Air Fleet (CRAF), and other contracts to move DOD passengers and cargo.

USTRANSCOM's timely delivery of forces and cargo would not be possible without the CRAF. The *quid pro quo* relationship between DOD and CRAF commercial airline partners provides DOD airlift in time of national emergency, in exchange for the opportunity to bid on DOD peace-time business. Today CRAF participation and annual DOD payments to CRAF carriers for airlift services are at an all-time high, nearly \$3.4 Billion.⁴ This enormous price tag comes at a time when DOD is facing record high budgets and doubling of wartime supplemental defense spending since 9/11.⁵ Secretary of Defense Robert Gates called for tighter scrutiny of all defense spending, seeking \$100 billion in savings over the next five years. With DOD fixed costs at an all-time high and recapitalization requirements in every direction, the challenge to win two wars and reset for the next in a fiscally constrained environment, is nearly untenable. As requirements continue to exceed funding, the DOD must leverage capabilities that work, and scrutinize spending across the board.

USTRANSCOM's current challenge is to find innovative ways to leverage CRAF capability to gain speed, efficiency, and capacity for the warfighter. USTRANSCOM Commander General Duncan McNabb recently testified to Congress that "Rapid global mobility is critical to USTRANSCOM's quick reaction capability to meet the needs of the joint forces and we need to continue recapitalizing our air mobility force."⁶ As the DOD moves forward into the next decade of economic uncertainty and shrinking defense spending, CRAF brings the most capability at the lowest price. Because CRAF represents DOD's most flexible and economical capacity for surge airlift, this paper draws the conclusion that

⁴ Mark Caslen (AMC/A3B CRAF Division), telephone interview with author, 17 Sep 2010.

⁵ Tom Vanden Brook, "Defense Secretary Gates Targets Jobs," *USA Today*, 9 August 2010. 1.

⁶ Colin R. Baske, "U.S. Air Mobility Forces Simultaneously Support Force Reductions in Iraq and Force Increases in Afghanistan", *Airlift/Tanker Quarterly*. Summer 2010, 6.

USTRANSCOM must transform CRAF capabilities to meet the evolving joint deployment mission in a fiscally constrained environment.

Background

The CRAF “experiment” was born out of the U.S. experience in World War II when President Roosevelt granted authority to take possession of any commercial aircraft required by the war effort.⁷ Just as today, the early CRAF program provided DOD with planning options to meet emergency airlift requirements which exceeded capacity of the organic military fleet. The importance of the military and civilian airline industry partnership was solidified again in 1987 by President Reagan’s National Airlift Policy which states, “It is therefore the policy of the U.S. to recognize interdependence of military and civilian airlift capabilities in meeting wartime airlift requirements, and to protect those national security interests contained within the commercial air carrier industry.”⁸ The National Airlift Policy also clarifies that during peacetime, the CRAF can be used to meet passenger and cargo requirements which cannot be met by the DOD organic fleet.⁹ One key component of CRAF is that it remains a voluntary program with an incentive to bid on DOD peacetime business. CRAF partners receive no compensation unless they are activated to meet DOD surge airlift during national emergencies, or they fly peacetime DOD missions. The relationship between CRAF partners and DOD is alive and well today, with 32 airlines committing over 1,100 aircraft.¹⁰

⁷ Mary Chenoweth, *The Civil Reserve Air Fleet: An example of the Use of Commercial Assets to Expand Military Capabilities During Contingencies*, RAND Report N-2838-AF (Washington DC: RAND, June 1990), 1-2.

⁸ Reagan, Ronald, "National Security Decision Directive: National Airlift Policy" 24 June 1987, <http://www.fas.org/irp/offdocs/nsdd/23-3032a.gif> (accessed 14 Sept, 2010), 2.

⁹ *Ibid*, 2.

¹⁰ Lyon, Dennis R. "Civil Reserve Air Fleet (CRAF) Capability Summary." Scott AFB, IL: DOD Commercial Airlift Division, HQ AMC/A3BC, 1 July 2010.

The majority of DOD's organic strategic airlift capability lies with AMC's C-17 and C-5 fleets, which unlike the CRAF fleet, have capacity and capability to deliver out-sized cargo. The complementing CRAF fleet is comprised of three main segments: International, National, and Aeromedical Evacuation (AE), with segment assignment predicated on DOD requirements and aircraft performance characteristics (see List of Tables pages 24-25).¹¹ Additionally, to tailor airlift for a national emergency, the CRAF is divided into three stages for incremental activation, and carriers are required to respond within 24 hours of activation. Stage I activation is for expanded peacetime requirements or a minor regional crisis and is comprised of long-range assets only.¹² Stage II is for one major theater war and comprised of national, international, and AE segments.¹³ Finally, stage III is for periods of national mobilization, and involves a total CRAF airlift recall.¹⁴ Over the 59-year history of CRAF, it was activated twice. Both were Stage I activations of the international passenger carriers. The first was from 18 August 1990 through 24 May 1991 in support of Operation Desert Shield/Storm, and the second was from 8 Feb 2003 through 18 June 2003 in support of OIF/OEF.¹⁵ In both cases, CRAF provided timely and economical surge airlift. To illustrate, CRAF carriers were paid \$1.5 billion during these activations, a fraction of the estimated \$15-\$50 billion required to provide similar DOD organic capability.¹⁶

Events following the 9/11 terrorist attacks drove DOD airlift requirements to all time highs while many segments of the commercial airline industry saw business plummet. In the

¹¹ Air Mobility Command, "U.S. Air Force Civil Reserve Air Fleet Fact Sheet," May 2007, [http://www.af.mil/information/factsheets/factsheet/factsheet_print.asp?fsID=173\\$page=1](http://www.af.mil/information/factsheets/factsheet/factsheet_print.asp?fsID=173$page=1) (accessed Aug 26, 2010).

¹² HQ Air Mobility Command C/A3B. *Air Mobility Command Instruction 10-402, Civil Reserve Air Fleet*. (Scott AFB, IL: HQ AMC, 2004), 2.20.

¹³ Ibid, 2.20.

¹⁴ Ibid, 2.20.

¹⁵ Christopher Bolkcom, *Civil Reserve Air Fleet CRAF*, Washington, DC: Congressional Research Service, 18 Oct 2006, 3.

¹⁶ Ibid, 4.

post 9/11 high-ops tempo environment, CRAF peace-time operations, or operations during non-activation stages, are now best described as „steady state operations“. To compare steady state operations in 2009, the CRAF flew 5,453 trips for USTRANSCOM, which is nearly equal to the 5,600 trips made by the CRAF during the entire 1991 Gulf War, when the CRAF was activated.¹⁷ CRAF partners are best able to employ resources to support their primary commercial obligations and steady state DOD business when they can see all requirements in advance. Consequently, USTRANSCOM gains more participation from CRAF partners by providing steady-state requirements in advance. This was evidenced by increased voluntary participation during requirement spikes throughout OIF and OEF, which avoided further CRAF activation during high ops periods following 9/11.¹⁸

Shared trust and fair financial incentives have sustained CRAF as a model government/private industry partnership which meets the DOD airlift gap, and assures CRAF partners guaranteed income with predictable operations. USTRANSCOM’s goal is to keep the CRAF a viable strategic and operational asset, able to rapidly respond to changing wartime requirements. Since commercial airline participation in CRAF is voluntary, USTRANSCOM goes to great lengths to reach a modus vivendi with both passenger and cargo partners. The maintenance of a symbiotic relationship between CRAF carriers and DOD is a success story. Today, DOD planning factors rely on the CRAF as the primary means of delivering passengers and bulk cargo in the event of an activation.¹⁹ Additionally, according to the recently completed Mobility Capability Requirements Study (MCRS), which informs DOD mobility planning, 57% of CRAF cargo capacity, and 55% of CRAF passenger

¹⁷ John A. Tirpak, "The Double Life of Air Mobility," *Air Force Magazine*, July 2010, 32.

¹⁸ Lt Col Christopher Gourdine (AMC Dep Division Chief CRAF), telephone interview with author, 13 Sept 2010.

¹⁹ Col Carl Lude and Col Jean Mahan, USAF, *Mobility Capabilities and Requirements Study 2016 (MCRS-2016 Executive Summary*, (Washington, D.C. Office of the Secretary of Defense, 2010), 6.

capacity is needed to meet activation requirements.²⁰ Unfortunately, even with excess CRAF capacity, there are policy and equipment barriers which reduce capability.

Enhance Current Capabilities

While just over half of current CRAF capacity is required to meet worst case DOD scenarios, the entire CRAF fleet is vulnerable to FAA policy, limiting employment capability. The DOD could realize full CRAF capability if partner airlines received relief from FAA operating restrictions while flying DOD missions. Since CRAF partners are required to be U.S. flagged carriers, they must operate under FAA Part 121 or 135 rules (commercial or commuter airlines) that regulate activities even while flying DOD missions. Depending on the mission, these restrictions can limit capability and efficiency of CRAF operations when compared to similar organic DOD missions which are not encumbered by FAA restrictions. One example of an FAA restriction is Special Federal Aviation Regulation No. 77, which prohibits operations in Iraqi airspace.²¹ Another more recent FAA mandate changes the way commercial carriers (including CRAF) schedule their crews to ensure compliance with new crew rest and duty day requirements. It is too early to estimate impacts of this regulation on the CRAF, but it will likely force international CRAF flights to land short of the normal destinations, to make a crew change and then continue the mission.²² Nonetheless, additional take-offs, landings, and crew changes result in delivery delays, and extra cost to name a few, which will ultimately be paid by the user.

Another operational limitation to CRAF capability is restricting carriers from operating into designated high threat areas, where many of USTRANSCOM's customers

²⁰ Col Carl Lude and Col Jean Mahan, USAF, *Mobility Capabilities and Requirements Study 2016 (MCRS-2016) Executive Summary*, (Washington, D.C. Office of the Secretary of Defense, 2010), 5.

²¹ Federal Federal Aviation Administration (FAA), DOT, "Special Federal Aviation Regulation (SFAR) No. 77," <http://www.iraqwatch.org/government/US/FAA/faa-sfar77.htm> (accessed Sept 24, 2010).

²² Mark Caslen (AMC/A3B CRAF Division), telephone interview with the author, 17 Sep 2010.

require airlift. In several cases, the restriction is due to CRAF aircraft lacking costly defensive systems designed to counter Man Portable Air Defense Systems (MANPADS) threats common to many of the non-permissive airfields U.S. forces use today. MANPADS are portable shoulder launched surface-to-air missiles which pose the greatest threat to aircraft during take-off and landing phases. Future threats may also limit CRAF aircraft from operating into a chemical or biological contamination area. The restriction typically forces CRAF aircraft to land short of a destination and transload cargo to an AMC aircraft with defensive systems. Another operational work-around is to schedule CRAF aircraft on strategic missions outside of the threat area, preserving the organic fleet for the threat areas. To illustrate, prior to 9/11 CRAF flew 24% of DOD channel cargo missions, the regularly scheduled time sensitive resupply missions delivered directly to the user at DOD installations with major air cargo hubs.²³ Today, the CRAF flies 72% of DOD channel cargo missions, freeing up the AMC organic fleet for deliveries to high threat areas.²⁴

Mitigating the MANPAD threat will allow the CRAF fleet to operate without restriction into more locations, and bring more capability to the warfighter. Currently, the Department of Homeland Security is the lead agency for Large Aircraft Infrared Countermeasures (LAIRCM) with DOD participation. Unfortunately, aircraft mounted defensive systems like LAIRCM are cost prohibitive to install on the CRAF. Another cost effective option to allow access to high threat airfields is to install a counter man-pad system to protect specific airfields. One such ground based system, called the Counter Man-Portable Air Defense System (CMAPS) detects multiple threats, tracks, and destroys the targets using

²³ Major Brett Sowell (USTRANSCOM J-5/4), e-mail to author, 10 Sept 2010.

²⁴ Ibid.

directed energy, similar to LAIRCM protocol.²⁵ Portable land-based protection would counter the MANPAD threat allowing theater direct delivery, to maximize CRAF capability. CMAPS is just one technology that brings more capability to the CRAF. The commercial airline industry offers additional new technology options to enhance CRAF capabilities which will be reviewed.

New Commercial Capabilities

Because CRAF leverages existing commercial airline capabilities, DOD focus has always been on strategic airlift. A new commercial capability to investigate is the civilian air-tanker which is gaining momentum as enterprising companies seek to meet expanding military aerial refueling requirements around the world. Additionally, there are two new multi-role tanker/transport aircraft on the market. The Boeing KC-767 and the EADS KC-45 are new mobility platforms with CRAF potential.

The idea of paying a premium to CRAF carriers for new capability began during the 1980s, when the USAF paid more than \$600 million to modify 24 commercial CRAF airplanes to accommodate out-sized equipment.²⁶ To incentivize modifications, DOD also paid operating subsidies to these CRAF carriers. Additionally, in the mid 1990's, DOD asked AMC to investigate providing incentives to CRAF carriers to purchase the most efficient commercial cargo jet, the Boeing 747-400.²⁷ Eight CRAF partners expressed interest, but the aircraft did not fit their commercial business strategy and the DOD would not subsidize equipment modifications or higher operating costs.²⁸

²⁵ Rob Dolittle, "Ground-Based Counter-MANPADS Aircraft," *Global Security.Org*. June 25, 2007. <http://www.globalsecurity.org/military/library/news/2007/06/mil-070625-general-dynamics02.htm> (accessed 23 Sept 2010).

²⁶ Congressional Budget Office, *Participation in the Civil Reserve Air Fleet*, Congressional Budget Office, February 1997, <http://www.cbo.gov/doc.cfm?index=11&type=0&sequence=9> (accessed Sept 21, 2010), 5.

²⁷ Ibid, 5.

²⁸ Ibid, 5.

Adding air-refueling capability to the CRAF is not a new concept. In 1997, USTRANSCOM formed a Contract Aerial Refueling Working Group (CARWG) to explore commercial air-refueling options.²⁹ The group examined options but without an established requirement, the fee-for-service model was not pursued. Since then, there has been significant change in requirements and technology while the KC-135 fleet has aged another 13 years. The soon to be awarded KC-135 replacement, the KC-X, will come off the production line requiring no modifications and have flexibility for use as a tanker, cargo, or passenger aircraft. If KC-X capability was available in the CRAF, it would easily be the most capable aircraft in the fleet and perhaps worthy of a premium for the unique capability provided.

The 2010 DOD Mobility Capabilities and Requirements Study highlights the USAF tanker shortfall. This two-year study examined three representative scenarios, which would employ mobility assets. The USAF tanker fleet came up 93 aircraft short of meeting requirements in the two most constrained cases.³⁰ To make matters worse, the KC-135 which makes up the majority of the USAF tanker fleet, is 50 years old, and a replacement contract has yet to be awarded. Due to budget constraints, tanker recapitalization funding is limited to \$3.5 billion annually, allowing for a projected procurement rate of 12 to 18 aircraft per year.³¹ By the time the KC-135 fleet is recapitalized, the last aircraft will be nearly 85 years old. In testimony to the Senate Armed Services Committee, General McNabb stated, “My number one recapitalization priority is replacing the fleet of 415 Eisenhower-era KC-135s with a new platform to preserve a unique asymmetric advantage for our nation. The KC-X with

²⁹ USTRANSCOM J-5/4, *Concept Development Report on Contracted Aerial Refueling*, Scott AFB, IL: U.S. Transportation Commad, 1998, 1.

³⁰ Col Carl Lude and Col Jean Mahan, USAF, *Mobility Capabilities and Requirements Study 2016 (MCRS-2016) Executive Summary*, (Washington, D.C. Office of the Secretary of Defense, 2010), 6.

³¹ Jeremiah Gertler, *Air Force KC-X Tanker Aircraft Program: Background and Issues for Congress*, (Washington, D.C., Congressional Research Service, 22 Dec 2009), 4.

multipoint refueling allowing same sortie service to Air Force, Navy, Marine and coalition aircraft will address the significant risk we are currently carrying in air-refueling capacity.”³²

The business case for a civilian tanker serving military needs has already been proven. Omega Air Refueling provides world-wide fee-for-service probe and drogue air-refueling to a host of customers including the U.S. Navy, Marine Corps, Germany, Canada, Australia, and the Royal Air Force.³³ Omega Air is paid through the Navy flying hour program, and offers capability on par with the AMC KC-135 and KC-10 at a rate of \$7,890 per flying hour for their KC-707 (KC-135 equivalent) and \$12,500 for their KDC-10 (KC-10 equivalent).³⁴ Compared to the flying cost paid for similar USAF tanking services, Omega Air is competitive to USAF rates but able to support probe and drogue requirements when the USAF cannot.³⁵

Current Joint DOD doctrine plans for refueling platforms to augment the airlift fleet.³⁶ Unfortunately, the KC-135 is primarily used as a tanker, and restricted in the airlift role to carrying six lightweight cargo pallets, and up to 50 passengers. The new KC-X will deliver about 1.1 to 1.3 times the air-refueling capacity of the KC-135, but because it is designed with cargo loading floors and doors, it will far exceed the KC-135 in cargo and passenger capacity. The two major KC-X contenders bring significant airlift capacity over the KC-135. Boeing’s KC-767 carries 190 passengers and 19 bulk cargo pallets, while the EADS North America

³² Gen Duncan J. McNabb, Commander USTRANSCOM. *Written Statement of Gen Duncan J. McNabb, Commander USTRANSCOM, Before the Senate Armed Services Committee*. Scott AFB, IL: USTRANSCOM, 17 Mar 2009. 6-7.

³³ Steve Doragh (US Navy Deputy Program Manager, Multi-Mission Aircraft PMA 207) interview with the author, 28 Sept 2010.

³⁴ Bud Orr (President Omega Air Refueling) telephone interview with the author, 16 Sept 2010.

³⁵ Steve Doragh (US Navy Deputy Program Manager, Multi-Mission Aircraft PMA 207) interview with the author, 28 Sept 2010.

³⁶ Lt Gen Lloyd J. Austin. *Joint Pub 3-17 Air Mobility Operations*. Washington, D.C., Joint Staff, 2009, V-8.

KC-45 (Airbus A330-200 derivative) carries 226 passengers and 32 pallets.³⁷ Equipped with defensive systems to allow theater direct delivery, the KC-X will move easily between tanker and transport roles, or a combination of the two. Additionally, because the aircraft can deliver and receive fuel, it will have nearly unlimited range to transport cargo and passengers to the warfighter. With an aging fleet and limited buying power, now is the time to explore tanker CRAF options, to include taking advantage of foreign capability.

International and Multi-National Partnerships

In today's global economy, innovative options are needed to bring foreign capability to the CRAF. USTRANSCOM is required to first award airlift contracts to U.S. flag carriers that are part of the CRAF. However, when CRAF does not have capability, CRAF partners are allowed to subcontract to approved foreign flag carriers that meet the requirement.³⁸ One example is that CRAF carriers have no capability for outsized cargo. World-wide, strategic airlift of outsized cargo is limited to the U.S. C-5, C-17, and the Russian/Ukraine An-124 and IL-76.³⁹ The An-124 and IL-76 both fly outsized DOD cargo and USTRANSCOM has leveraged them heavily. From 11 September 2001 through 22 June 2010, AN-124s, and IL-76s augmented the CRAF fleet with over 4 million flight hours, earning \$1.5 billion in CRAF revenue from the DOD.⁴⁰

The U.K. is in a similar situation to the U.S., with an aging tanker fleet of 19 aircraft, more tanking requirements than capacity, and no money to recapitalize. Enter the Future Strategic Tanker Aircraft (FSTA) program, a private finance initiate with AirTanker Limited a consortium group, to provide a new fleet of 12 Airbus A330-200 multi-mission

³⁷ Col Michael Isherwood, USAF, Retired, "The Game Changer for Mobility," *Air & Space Power Journal*, 1 Sept 2009, <http://www.airpower.au.af.mil/airchronicles/apj/apj09/fal09/Isherwood.html> (accessed 24 Sept 2010), 3.

³⁸ Hall, Pamela (USTRANSCOM Contracting Officer) telephone interview with the author, 24 Sept 2010.

³⁹ Sergio Coniglio, "Strategic Airlift and Logistic Air Support," *Military Technology*, May 2010, 69.

⁴⁰ Major Brett Sowell (USTRANSCOM J-5/4), e-mail to author, 10 Sept 2010.

tanker/airlifters.⁴¹ The U.K. pays a fee-for-service, while AirTanker provides air-refueling and airlift capacity for a contracted period of 27 years, and pays all capital costs to include infrastructure modifications to the host U.K. airfield.⁴² The U.K. will retain permanent access to nine aircraft and the remainder will be available for commercial use by AirTanker, to include making the aircraft available to other governments.⁴³ Reviewing the FSTA as a business model for a U.S. Tanker-CRAF would be a worthwhile endeavor, especially if the USAF KC-X contract is awarded to EADS.

Exploring options to capture foreign capability for the CRAF should also include options for offering excess CRAF capacity to our international partners. The opportunity to strengthen international partnerships and build new ones using commercial resources which already operate globally, offers efficiency and effectiveness. Additionally, building these global partnerships can be beneficial to the DOD by taking advantage of commercial expertise operating outside of the CONUS, and providing competitive bid pricing. By way of example, USTRANSCOM recently awarded 12 contracts worth \$2.4B, for vertical lift, and Short Take Off and Vertical Landing (STOVL) capability in Afghanistan.⁴⁴ These contracts went to both U.S. and foreign companies, as will another \$5.5B for similar services in the near future.⁴⁵

Adding foreign carriers to CRAF will bring new capabilities, competitive pricing, and local expertise for niche services like STOVL and heavy vertical lift. Allowing foreign ownership in CRAF may eventually open the door for foreign ownership of U.S. based airlines as well. Foreign investment in the U.S. airline industry (including CRAF) has been

⁴¹ Defense Management, "You Can't Kick ass Without Tanker Gas," *Defense Management.com*, 16 Sept 2010, http://www.defencemanagement.com/feature_story.asp?id=14863 (accessed Sept 25, 2010).

⁴² Defense Management, "You Can't Kick ass Without Tanker Gas," *Defense Management.com*, 16 Sept 2010, http://www.defencemanagement.com/feature_story.asp?id=14863 (accessed Sept 25, 2010).

⁴³ Robert Wall and Douglas Barrie, "Refueling Ramp-Up," *Aviation Week & Space Technology*, 8 Mar 2010, <http://web.ebscohost.com/ehost/delivery?vid=4&hid=11&sid=85fbceal-3568-4129-a35a-f> (accessed Sept 10, 2010).

⁴⁴ Hall, Pamela (USTRANSCOM CRAF Contracting Officer) e-mail to the author, 28 Sept 2010.

⁴⁵ *Ibid*, 1.

limited by four reasons: Increased competition to domestic carriers; possible transfer of U.S. jobs to a foreign workforce; unfair competition from airlines receiving foreign government subsidies; and DOD concern for negative impacts to CRAF.⁴⁶ Each of these concerns appears dated, and many economists believe that more foreign investment in U.S. airlines would improve the financial health of the airline industry. Additionally, the Department of Transportation (DOT) recently supported legislation raising the allowable foreign ownership of U.S. airlines to allow easier access to foreign capital for U.S. airlines.⁴⁷ As USTRANSCOM continues leveraging foreign commercial aviation capability, future foreign technologies should also be investigated.

Partner with Industry on Future Technologies

USTRANSCOM and CRAF partners share many common interests making future lift technologies beneficial to both. As the DOD begins research, development and testing on the next generation of mobility aircraft, it is beneficial to dialogue with CRAF partners to determine if there is a business case for a civilian variant. Future purchases of military aircraft will be more cost effective in both production and sustainment if they can be tied to a commercial production line. One such future technology with mutually beneficial opportunity is the heavy lift hybrid airship. With payload estimates in the 1,000 ton category, advocates believe this future platform will fill voids between sea lift ships, and cargo aircraft.⁴⁸ A recent study estimated that the life cycle cost to develop and procure 14-16 heavy-lift airships is the same as the cost of 21 C-17 aircraft (\$11 Billion), but the airship

⁴⁶ Government Accountability Office, *Foreign Investment in U.S. Airlines GAO-04034R*. Washington, DC: GAO, 30 October 2003, 8.

⁴⁷ Department of Transportation, *Actual Control of U.S. Air Carriers. Proposed Rules*, Washington DC: Federal Register/ Vol. 70. No. 214/67389, 7 November 2005.

⁴⁸ Christopher Bolkcom, *Potential Military Use of Airships and Aerostats*, Washington, D.C.: Congressional Research Service, 11 Nov 2004, 5.

would deliver cargo at three times the rate.⁴⁹ Realizing this potential, USTRANSCOM, and AMC continue to investigate hybrid airship concepts for mobility mission areas.⁵⁰

Advances in vertical lift technologies will have applications for several sectors of the commercial market, making them ideal candidates for the CRAF. Worldwide today some 32 companies are involved in the design or manufacture of commercial airships and aerostats.⁵¹ Another possibility to partner with the airline industry, multiple services, or perhaps a multinational partner is on development of the Joint Future Theater Lift (JFTL) aircraft. This platform will have similar capabilities to a C-130 or a heavy lift helicopter, and be able to operate from naval vessels to ensure access to remote areas.⁵² Such an aircraft would be of use in land-locked countries like Afghanistan, requiring extensive vertical lift resupply, much of which is contracted out to non-CRAF carriers. Finally, strategic partnerships are already in place between manufacturer Boeing and logistics solutions provider Canadian SkyHook International, who are building a hybrid airship/helicopter for commercial applications.⁵³

New lift technologies can offer a trade-off between speed and lift capacity that will likely find application in the commercial airlines industry. As the technology matures and efficiencies are made, the CRAF offers opportunity to bring new capability to the DOD, and in many cases avoid accompanying research, development, and testing costs.

⁴⁹ Christopher Bolkcom, and Knight William, *Strategic Airlift Modernization: Analysis of C-5 Modernization and C-17 Acquisition Issues*, Washington, D.C., Congressional Research Service, 15 April 2008, 38.

⁵⁰ Air Mobility Command, *Air Mobility Master Plan 2010*, Scott AFB, IL: HQ Air Mobility Command A8XPL, 2009, 31.

⁵¹ Christopher Bolkcom, *Potential Military Use of Airships and Aerostats*, Washington, D.C.: Congressional Research Service, 11 Nov 2004, 1.

⁵² U.S. Government Accountability Office, *Strategic Airlift Gap Has Been Addressed, but Tactical Airlift Plans Are Evolving as Key Issues Have Not Been Resolved*. Report to the Subcommittee on Air and Land Forces, Committee on Armed Services, House of Representatives, Washington, D.C., GAO, 2009, 42.

⁵³ Lewis Page, "Boeing to Build Combo Airship-Copter Flying Cranes, Canadians Plan Worldwide Rental Whirlyblimp Service," *The Register*, 11 July 2008, http://www.theregister.co.uk/2008/07/11/skyhook_jhl_40_boeing/print.html (accessed Sept 25, 2010).

Counterargument

With participation and DOD payments to CRAF carriers at the highest level in history, future capacity appears assured. Organic fleet sizes, and contingency planning factors have been adjusted to take full advantage of CRAF capacity. In 2008, former USTRANSCOM commander and now Air Force Chief Norton Schwartz testified before the Senate Armed Services Committee that limiting USAF C-17 purchases to 205 airplanes was needed because the DOD organic fleet competes in peace-time with the CRAF.⁵⁴ Boeing will deliver the last USAF C-17 in 2011, leaving CRAF as the only means to absorb future wartime surges. Despite the guarantee of DOD business, at least one area of concern remains. Since the CRAF is an annual contract, partner carriers may find that commercial revenues are more profitable than DOD business and elect not to renew their contract. USTRANSCOM is keenly aware of this risk and is fully engaged to prevent this possibility.⁵⁵

In 2002, the House Armed Services Committee, concerned about CRAF health, commissioned a GAO study which identified two areas for improvement. First, stronger financial participation incentives were needed, and second, since partners with Boeing 747s were receiving the majority of the DOD peace-time missions, the recommendation was to look at employing smaller wide-body CRAF aircraft.⁵⁶ USTRANSCOM addressed these concerns and further strengthened the CRAF business model by creating joint venture teams. During non-activation periods, CRAF partners who find civilian business more profitable than DOD, have the flexibility to fill DOD requirements by selling their peacetime entitlements to

⁵⁴ Gen Norton A. Schwartz Commander USTRANSCOM, "Testimony," Senate, *Armed Services Subcommittee on Seapower on Fiscal Year 2009 Budget for the Department of Defense Strategic Lift Programs*, 110th Cong., 2nd sess., 2008. <http://armed-services.senate.gov/Transcripts/2008/03%20March/Seapower/08-23%20-%203-12-08.pdf> (accessed Oct 1, 2010).

⁵⁵ Major Brett Sowell (USTRANSCOM J-5/4), telephone interview with the author, 10 Sept 2010.

⁵⁶ United States General Accounting Office (GAO), *Civil Reserve Air Fleet Can Respond as Planned, but Incentives May Need Revamping*, Report to the Chairman, Subcommittee on Military Readiness, Committee on Armed Services, House of Representatives, Washington, D.C., 2002, 2.

CRAF teammates who rely on the DOD for the majority of their business.⁵⁷ Additionally, Congress in recognizing the importance of strengthening CRAF participation, granted USTRANSCOM authority in the FY09 National Defense Authorization Act to guarantee minimum levels of business, and improve predictability of DOD requirements.⁵⁸ Finally, in May of 2010, USTRANSCOM established an Executive Working Group (EWG) that met with all CRAF carriers and the DOT. The EWG met to strengthen the strategic relationship between all parties and agreed to several proposals providing fair incentives for capability, reliability, efficiency, and activation to name a few.⁵⁹ Most of the recommendations will influence the FY 11 CRAF contract which is currently under negotiation.

The immediate future of CRAF appears secure, with partners committing nearly double the number of airplanes required for the DOD's most demanding war plans.⁶⁰ While surge capacity is not a problem today, the long term focus needs to be on achieving more CRAF *capability*. Because CRAF represents DOD's most flexible and economical capability for surge airlift, USTRANSCOM must continue to transform CRAF capabilities to meet the evolving joint deployment mission in a fiscally constrained environment.

Recommendations

The arguments above offer opportunities for USTRANSCOM to further investigate each of the four recommendation areas summarized below.

Enhance Current Capabilities: The first recommendation is to develop a comprehensive list of FAA operating restrictions limiting to the CRAF. A possible discussion forum to gain insight from CRAF carriers is the newly created CRAF Executive Working

⁵⁷ Major Brett Sowell (USTRANSCOM J-5/4), telephone interview with the author, 10 Sept 2010.

⁵⁸ Gen Duncan J. McNabb, Commander USTRANSCOM. *Statement before the Senate Armed Services Committee*. Scott AFB, IL: USTRANSCOM, 17 Mar 2009, 8-9.

⁵⁹ USTRANSCOM J-5/4. "CRAF Executive Working Group," Power Point, Scott AFB, IL, 20 May 2010.

⁶⁰ Col Carl Lude and Col Jean Mahan, USAF, *Mobility Capabilities and Requirements Study 2016 (MCRS-2016) Executive Summary*, (Washington, D.C. Office of the Secretary of Defense, 2010), 6.

Group (EWG). After reaching a consensus, USTRANSCOM can begin a dialogue with the FAA to determine pragmatic solutions that would afford CRAF carriers on DOD missions, relief from restrictive operating regulations. Another recommendation to enhance capability by flying CRAF aircraft into airfields threatened by MANPADS is to investigate options to employ a Counter Man-Portable Air Defense System (CMAPS) at selected airfields. Adding this capability to the Air Force Contingency Response Wing's airfield opening and sustainment functions is a possible employment option.

New Commercial Capabilities: Implementing the second recommendation, adding commercial capability, will take further discussions between USTRANSCOM and industry. With the KC-X still not awarded and the KC-135 fleet approaching 50 years, reestablishment of the CARWG to review options with industry appears to offer an established venue. According to Omega Air's CEO, there are two favorable business cases to bring new civilian contract aircraft into the CRAF. The first involves retrofitting commercial aircraft with booms from retired KC-135 aircraft, and the second is to purchase KC-X aircraft and provide fee-for-service capability to the DOD.⁶¹ A future review by the CARWG should also include U.S. allies who have already begun taking advantage of KC-X technologies. Japan and Italy purchased the KC-767, while Australia, Britain, Saudi Arabia and the UAE bought KC-45s.⁶² Since there is no plan to recapitalize the last KC-135 until it is 85 years old, a tanker CRAF appears to be a viable option to manage aerial refueling effectiveness, thus ensuring capability. Finally, a tanker CRAF appears to offer a hedge against risk for the KC-135 fleet

⁶¹ Ulick McEvaddy, (Omega Air Cheif Executive Officer), Interview by the author, 16 Sept 2010.

⁶² Col Michael Isherwood, USAF, Retired. "The Game Changer for Mobility." *Air & Space Power Journal*, Sept 1, 2009. <http://www.airpower.au.af.mil/airchronicles/apj/apj09/fal09/Isherwood.html> (accessed Sept 24, 2010), 4.

that continues operating beyond planned life expectancy, forcing AMC to invest more capital and maintenance manpower, while receiving less capability in return.⁶³

International and Multi-National Partnerships: As USTRANSCOM adds foreign capability to the CRAF, the EWG offers another forum to investigate options for offering excess CRAF capability to our international partners. The opportunity to strengthen international partnerships and build new ones using commercial resources which already operate globally, appears to offer efficiency and effectiveness.

The main hurdle to overcome before foreign capability can be added to the CRAF is the Fly American Act, which requires CRAF carriers to be U.S. flagged.⁶⁴ One option is for foreign carriers desiring to do business with the DOD to set up a U.S. affiliate company. Another option to add foreign investment in CRAF is to amend current legislation. As USTRANSCOM has already learned, foreign carriers bring capability and efficiencies not found in the U.S. commercial aviation industry, like out-sized airlift. Congress recently provided legislative incentives to preserve CRAF capacity and with DOD and DOT support, changing legislation to allow foreign ownership of CRAF will bring capability, competition and efficiency to the DOD. Requesting legislative relief today fits the current climate for DOD fiscal restraint, and the establishment of foreign CRAF partnerships may even prove to be an effective diplomatic tool.

Partner with Industry on Future Technologies: Partnering with the transportation industry is one of USTRANSCOM's functions as the deployment and distribution process owner, and architect of future DOD transportation systems. As USTRANSCOM moves forward developing the next generation of mobility capabilities, opportunities exist to create a

⁶³ Air Mobility Command, *The Imperative for a New Tanker Now*. Scott AFB, IL: HQ AMC Directorate, Strategic Plans, Requirements, and Programs, Sept 2009, 6.

⁶⁴ Major Brett Sowell (USTRANSCOM J-5/4), telephone interview with the author, 10 Sept 2010.

formal mechanism like the CARWG or the EWG that will partner with the commercial airline industry to leverage their innovations and efficiencies. Since CRAF carriers compete for profitability with many of the same capabilities as AMC, understanding the future commercial marketplace will prove beneficial as USTRANSCOM defines future requirements. Additionally, since future military production lines will achieve the greatest cost savings when tied to a commercial production line, early dialogue with CRAF partners and airline manufactures offer opportunities to create sustainability, efficiency, and bring new capabilities in a fiscally responsible manner.

Conclusion

Today more than ever, the DOD needs fiscally sound pragmatic solutions to maximize capability, minimize cost, win the war on terror, and recapitalize the force. Rising operations and maintenance costs, military pay, and healthcare expenditures erode buying power of service budgets, and result in recapitalization shortfalls. With economic uncertainty and increasing national debt, Congress will tighten supplemental wartime funding, forcing more capability from the DOD budget. The Congressional Budget Office recently calculated the cost of operations in Iraq and Afghanistan to date at \$1.1 trillion, and estimates another \$1.7 trillion will be spent over the next decade to complete these operations.⁶⁵ Secretary Gates affirmed U.S. strategic strength is linked to fiscal health of the nation and “The DOD’s track record as a steward of taxpayer dollars leaves much to be desired.”⁶⁶ The DOD will make hard choices to secure the right capabilities needed to win current and future conflicts, in a fiscally responsible manner.

⁶⁵ *Air Force Times*, "CBO: More than \$1 Trillion Spent in Iraq and Afghanistan," Sept 20, 2010: 16.

⁶⁶ Dr. Robert M. Gates, "Remarks of Secretary of Defense Robert M. Gates," *Naval War College Review*, Autumn 2010, Volume 63, Number 4: 9-17.

Future operations are sure to be marked with a need for increased rapid global mobility, requiring both airlift and air-refueling to enable joint forces. Without CRAF, the DOD cannot meet mission requirements. Growing capabilities within CRAF by leveraging commercial aviation strengths brings more capability at a fraction of the cost. With constrained DOD budgets and U.S. defense industrial base concerns, CRAF offers the best opportunity to meet future global mobility requirements. CRAF also offers great prospect to leverage innovation and cost savings from the commercial aircraft industry. Transforming CRAF capabilities will take leadership at many levels. Innovation is never automatic or inevitable, it takes deliberate leadership.

This paper explored four opportunities to gain more capability from the CRAF; enhance current capabilities, new commercial capabilities, international and multi-national partnerships, and finally partnering with industry on future technologies.

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Figure 1: July 2010 CRAF Carrier Summary

CIVIL RESERVE AIR FLEET (CRAF) CAPABILITY SUMMARY												SOURCE: HQ AMC/A3BC		AS OF: 1 July 2010		
INTERNATIONAL SEGMENT - LONG-RANGE SECTION (Minimum Range of 3500 Nautical Miles)																
AIRLINE AND CRAF STAGE		American Airlines (AA)			Continental Airlines (COA)			Delta Air Lines (DAL)			Hawaiian Airlines (HAL)			North American (NAO)		
AIRCRAFT TYPE		I	II	III	I	II	III	I	II	III	I	II	III	I	II	III
P A330-200 / 300											3	4	32			
A B747-200											2	8	16			
S B747-400											3	3	27			
E B757-200 / 200ER / 300ER		31						41			1	1	44	1	2	6
N B767-200ER / 300ER / 400ER		58						7	26		2	14	18		1	4
G B777-200 / 200ER		7	22	47				2	5	20						5
E DC-10-10 / 30 / 30ER																5
R MD-11 / 11ER																3
TOTALS		7	22	136				2	12	87			11	30	137	1
AIRCRAFT AND CRAF STAGE		ABX Air (ABX)		Air Transport Int'l (ATN)		Arrow Air (APW)		ASTR Air Cargo (DHL)		Atlas Air (GTT)		Evegreen International (EIA)		FedEx Airlines (FDX)		Kalitta Air (C/S)
AIRCRAFT TYPE		I	II	III	I	II	III	I	II	III	I	II	III	I	II	III
B747-100F / 200F / 300F											2	2	6	3	10	3
B747-400F											1	6	13			2
C B767-200SF / 300F		1	2	10												3
A DC-6 / 62F / 63F																2
R DC-8 / 7F / 73F																3
G DC-621 / 72 COM(B)																3
O DCMD10-30F / 40F / CF																3
MD-11F / CF																59
TOTALS		1	2	10	2	5	10	1	2	3	1	2	8	3	20	3
AIRCRAFT AND CRAF STAGE		Omni Air International (OAI)		Ryan International (RYN)		United Airlines (UAL)		US Airways (USA)		United Airlines (UAL)		US Airways (USA)		World Airways (WOA)		CONFIGURATION
AIRCRAFT TYPE		I	II	III	I	II	III	I	II	III	I	II	III	I	II	III
P A330-200 / 300											1	3	16			
A B747-200											1	3	16			
S B747-400											3	11	25			
E B757-200 / 200ER / 300ER		3	3					1	1					5	19	41
N B767-200ER / 300ER / 400ER		3	3					2	3					PN	B767-200	0
G B777-200 / 200ER		4	7	9				3	6					PN	B777-200	4
E DC-10-10 / 30 / 30ER														PN	B767-400	5
R MD-11 / 11ER														PN	B767-400	7
TOTALS		4	10	15				2	4	7	6	19	92	1	3	43
AIRCRAFT AND CRAF STAGE		National Airlines (NAA)		Polar Air Cargo (PAC)		Southern Air (SOO)		UPS Airlines (UPS)		UPS Airlines (UPS)		World Airways (WOA)		CONFIGURATION		AIRCRAFT TYPE
AIRCRAFT TYPE		I	II	III	I	II	III	I	II	III	I	II	III	I	II	III
B747-100F / 200F / 300F								1	1							
C B747-400F								3	7	16						
A DC-6 / 62F / 63F								1	3	6						
R DC-8 / 7F / 73F		1	1	1												
G DC-621 / 72 COM(B)																
O DCMD10-30F / CF																
MD-11F / CF																
TOTALS		1	2	3				1	3	7	6	19	92	1	3	43
LONG-RANGE INTERNATIONAL GRAND TOTALS																
72																

Figure 2: July 2010 CRAF Carrier Summary

INTERNATIONAL SEGMENT - SHORT-RANGE SECTION (Minimum Range of 1,500 Nautical Miles)															CARGO															
ARLINE AND CRAFT STAGE		American (AA)		Brendan (BWT)		Continental Mc (COA)		Delta Air Lines (DAL)		JetBlue (JBL)		Main Air (S90)		Sun Country (SCA)		TOTAL EACH STAGE		ABX Air (ABA)		Lynden Air (L1C)		Northern Air Cargo (NAC)		TOTAL EACH STAGE						
AIRCRAFT TYPE															AIRCRAFT TYPE															
PASSENGER																														
A320-200																														
B727-200																														
B737-400/700/800/900	1	36																												
B757-200/300																														
B767-200ER																														
TOTALS	1	36	2	105	1	5	1	40	1	3	3	3	30	1	39	1	8	1	4	12	320	TOTALS	5	5	1	1	3	3	9	9
DOMESTIC SERVICES SECTION (Meters or No FAI International Authority)															DOMESTIC SECTION															
AEROMEDICAL EVACUATION SEGMENT (B-1st Aircraft Only)															DOMESTIC SERVICES SECTION (Meters or No FAI International Authority)															
ARLINE AND CRAFT STAGE															AIRLINE AND CRAFT STAGE															
AIRCRAFT TYPE															AIRCRAFT TYPE															
B707-300ER (LDR)	25	33													A319 (100)															
TOTALS	25	33	2	6	27	39	TOTALS	2	3	2	2	2	3	17	28															
CAPABILITY STAGES															STAGES															NOTES:
MTM / NPM															ARLcraft SUMMARY (Number of aircraft)															
DOMESTIC SERVICES PAX (NPM)															DOMESTIC SERVICES PAX															
AIRLASH CARGO (MTM)															3,331	5,168														
SHORT-RANGE INTERNATIONAL CARGO (MTM)															0,066	0,066														
SHORT-RANGE INTERNATIONAL PAX (NPM)															0,48	0,48														
AEROMEDICAL EVACUATION (NPM)															2,631	69,323														
LONG-RANGE INTERNATIONAL PAX (NPM)															13,683	19,527														
LONG-RANGE INTERNATIONAL CARGO (NPM)															21,723	62,263	227,553													
LONG-RANGE INTERNATIONAL CARGO (MTM)															5,135	12,884	41,583													
WIDE BODY EQUIVALENTS															TOTAL CRAF															
AEROMEDICAL EVACUATION															19,225	27,477														
LONG-RANGE INTERNATIONAL PAX															30,589	87,668	320,357													
LONG-RANGE INTERNATIONAL CARGO															30,417	75,485	243,946													
WIDE BODY EQUIVALENTS TOTALS															61,006	182,258	591,780													

AMC FORM 312, Microsoft Excel Version: 2003/11/16 [Version]


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¹ CMI, New Carrier, Add 3 x B-737-300 (SR-P)
² EIA, Add 1 x B-747-200F (LR-C)
³ GTI, Add 1 x B-767-200F (LR-C)
⁴ GMW, New Carrier, Add 5 x A320-200 (SR-P)
⁵ NEC, New Carrier, Add 2 x DC-6 (LR-C)
⁶ R/N, Add 2 x B-767-200ER (LR-P)
⁷ UAL, Add 1 x B-747-400 (LR-P)
⁸ USA, Add 2 x A330-200 (LR-P), add 5 x B-767-200 (AE)

⁹ OEM R/TM updated aircraft performance data, causing a change to WEE and WPM totals in LR-P, Stages I - II

¹⁰ CONFIGURATION ON FRONT SIDE:

C = CONVERTIBLE

F = FREIGHTER

P = PASSENGER

W = WIDE BODY

N = NARROW BODY

2. OBSERVATIONS:

LR-P = Return Range Passenger
 LR-C = Return Range Cargo
 LR-P = Return Range Passenger
 LR-C = Return Range Cargo
 DC-6 = Domestic Passenger

3. CAPABILITY REFLECTED IN MILLIONS OF TON OR PASSENGER MILES (MTM OR MPH) PER DAY.

4. CARGO CAPABILITY BASED ON COMBINATION OF BULK & OVERSIZE.

5. ALL NUMBERS IN STAGES I, II & III ARE CUMULATIVE.